Pseudoaneurysm of Internal Carotid Artery Following Mandibular Reconstruction Treated by Covered Stent

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Summary

We describe the case of a 68-year-old woman who had a mandibular titanium plate reconstruction following surgery for a parotid carcinoma. Fifteen months later she presented bleeding episodes related to a pseudoaneurysm of the internal carotid artery located just above the bulb. This was probably related to the weakening of the arterial wall following friction with the mandibular plate and radiotherapy. We successfully obliterated this pseudoaneurysm using a covered stent.

This rare diagnosis should be evoked in case of bleeding following a mandibular reconstruction. Stenting is an effective treatment strategy obviating the need for open surgery.

Introduction

Pathology, mainly stenosis [1], of carotid arteries is frequent following treatment for head and neck cancer. It is related to surgical dissection, external radiotherapy or local evolution of tumours. Pseudoaneurysms of the carotid artery are seldom cited in the literature [2,4,5,6].

We present a case of ruptured carotid artery pseudoaneurysm presumably related to the mandibular plate reconstruction. This pseudoaneurysm was treated in emergency by a covered stent.

Case Report

Our patient was a 68-year-old woman. She underwent surgery for a huge adenoid cystic carcinoma of the parotid gland involving the right mandible, masticator muscles and floor of the mouth. The ipsilateral lymphatic nodes were considered suspect on the initial CT scan and a selective neck dissection was performed, sacrificing at the same time the external carotid artery found close to the tumour.

The reconstruction was achieved with a titanium plate and a pectoralis major musculo-cutaneous flap. After healing, surgery was completed by external radiotherapy (mean 50 Gy on the neck and 66 Gy on the tumor area) taking into account the positive margin and the huge extension of the tumour. Fifteen months after the end of the treatment, she presented a small parasymphyseal plate exposure on the cutaneous side.

Multiple biopsies were performed and all were negative. Meanwhile, the patient began to describe nocturnal episodes of bleeding, exteriorized at the level of plate exposure. She was regularly followed, and because bleeding episodes were described as minimal, they were related to the wound. These bleeding episodes increased in frequency and in volume. A control CT scan revealed a well-collected non-enhanced fluid collection (figure 1). This was in-

Figure 1 Post-contrast axial CT scan shows a well-limited fluid collection contiguous to the mandibular prosthesis. No enhancement is observed inside the collection.

terpreted as an inflammatory process related to the plate. A month later, the patient was admitted in emergency after a massive episode of red blood bleeding that required transfusion. Conventional angiography was decided and performed under local anesthesia. This exploration revealed a pseudoaneurysm of the internal carotid artery, just above the bulb, in contact with the reconstruction plate (figure 2).

During angiography, a massive bleeding episode occurred, probably due to contrast injection, once again requiring transfusion. At the same time, we performed manual compression of the right carotid artery. A 7 mm x 5 cm covered stent (Viabahn, Flagstaff, AZ) was placed across the pseudoaneurysm with an 035/260 cm Amplatz guidewire (Boston Scientific Corporation, Miami, FL). That stopped the haemorrhage and cured the pseudoaneurysm (figure 3). No balloon angioplasty was needed. Aspirin and heparin were introduced immediately and clopidogrel six hours later. There was no neurological complication and no further bleeding.

Figure 2 Frontal and lateral views of conventional angiogram show a pseudoaneurysm developed on the lateral wall of the internal carotid artery. The pseudoaneurysm overlies the horizontal part of the titanium prosthesis.

Figure 3 Frontal view of conventional angiogram after the deployment of a covered stent shows complete exclusion of the pseudoaneurysm.

Aspirin and heparin were stopped after two months but clopidogrel was continued at a dose of 75 mg daily. Three months later, a control CT scan showed the stent in place, a permeable vessel and the close relation between carotid artery and the plate (figures 4 and 5). The plate was then removed carefully and trophic problems spontaneously resolved.

Discussion

A pseudoaneurysm, or false aneurysm, involves a defect of the intima and media with, initially, continuity of the adventitia. It can have different causes: atheroma, dissection which can be spontaneous or traumatic (including iatrogenic trauma caused by radiotherapy).

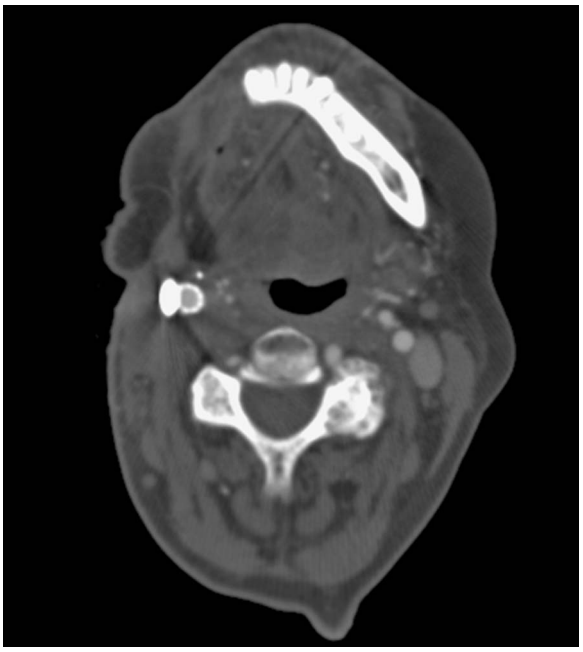

Figure 4 Follow-up post-contrast axial CT scan shows the stent adjacent to the prosthesis with a permeable vessel lumen and with no evidence of collection.

Figure 5 CT scan reconstruction, obtained by the volume rendering technique, shows the contact between titanium plate and stented internal carotid artery.

Our observation allows us to describe a rare complication related to the titanium plate used for mandibular reconstruction. This uncommon complication led to a delay in the diagnosis, potentially dangerous for the patient.

During initial surgery, the plate was placed close to the artery because of the large resection (involving the external carotid artery and masticator muscles), and despite the placement of a musculo-cutaneous flap in the bed of resection. This close contact led to erosion of the artery and the constitution of a pseudoaneurysm. As the main complication related to a titanium plate is skin exposure, the close contact between the plate and the artery, as showed by the follow-up CT scan, is probably the main aetiology in this observation. This close contact is infrequent but may be encountered after large dissection. This diagnosis must be evoked in cases of episodes of bleeding. Ruptured internal carotid pseudoaneurysm with an osteoradionecrotized bone has also been reported by Chen et Al[2].

Radiotherapy likely played a major part in this erosion by weakening the arterial wall, as is often described in literature [2,3,4,5]. The intermittence of bleeding episodes resulted in a two-month delay in the diagnosis. The major apprehension was the risk of cancerous recurrence which was set aside by the CT scan and the biopsies, but the pseudoaneurysm, not enhanced by the injection, was misdiagnosed.

The persistence and accentuation of bleeding episodes led to vascular exploration which allowed the diagnosis and therapy in emergency. In our case, because of surgery and secondary cutaneous erosion, the rupture of the pseudoaneurysm resulted in blood exteriorization and a life-threatening hemorrhage. The rupture of pseudoaneurysms with intact cutaneous and aponeurotic muscle layers may result in a mass effect with nervous or airway compression.

Four treatment strategies are possible: occlusion of the ICA following an occlusion test, occlusion of the pseudoaneurysm by coiling alone, coiling through an open stent[6] or use of a covered stent [5]. Occlusion of the ICA is probably not suitable in an emergency because it requires a preliminary occlusion test. Coiling can be performed but may be aggressive as a pseudoaneurysm does not have a real wall. Coiling through an open stent is a real alternative but there is a risk of continuous bleeding through the stent interstices if pseudoaneurysm obliteration is incomplete. As our patient was bleeding on the angioroom table, we chose a covered stent which allows an immediate closure of the incompetent arterial wall segment. Nevertheless, there is a risk of stenosis after stent placement.

Some pseudoaneurysms might have a spontaneous capacity of repair; but in our case, the persistant cause of erosion (the plate) and the irradiation vasculopathy makes a spontaneous repair unlikely and a treatment is compulsory.

In conjunction with excluding the pseudoaneurysm, suppression of a potential helping factor, the plate in this case, is necessary.

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